Final Project Report

Subtask A2.4.3

for

Marquez Low Flow Diversion Project

Prepared by:

City of Los Angeles, Department of Public Works,
Bureau of Sanitation, Watershed Protection Division

November 30, 2007

This report is prepared in accordance with agreement 02-231-550-1 between the State of California and the City of Los Angeles. Funding of this project has been provided in part through an agreement with the State Water Resources control Board under the Clean Beaches Initiative Grant Program through proposition 40 grants. The contents of this document do not necessarily reflect the views and policies of the SWRCB.

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Executive Summary

The City of Los Angeles build the Marquez Low Flow Diversion Project to improve the bacterial water quality at the nearby beach, reduce the number of dry weather beach warnings and closures, protect public health, and comply with its NPDES permit requirements. The project is designed and built to intercept the dry weather urban runoff from the 4-foot diameter Marquez storm drain and divert it into the sanitary sewer. The total project cost was $1.4 M of which $870,000 was funded by the Clean Beaches Initiative program of the State of California.

Design of projected started in June of 2003 and construction was completed in late 2006. During the 2007 dry-weather period the water quality at the storm drain outlet to the beach was monitored. This data indicates that the project has been a success in eliminating almost all exceedances of established bacterial standards.

The data from the tested samples (as shown in Table 5) at the site show a marked improvement in the water quality, due to the fact that there has been only one exceedence during the 2007 testing period. The monitoring data and discussions/comparisons for the dry period are provided later in this document. Also the geometric means for the three indicators are at, or near, the lower detection limits for these samples (10 MPN/100 mL).

The data for the tests conducted during the dry weather period from April 1 to October 31, 2007 indicates that the construction/installation of the Marquez Low Flow Diversion has reduced the exceedence days in Santa Monica Bay, thus proving to be beneficial to the receiving waters, public recreation reduction in dry weather beach warnings, beach closures, and improvement to marine life habitat.

The project also significantly reduced the amount of bacterial contamination discharged into the ocean protecting residents and tourists from contaminated storm drain flows at the beach. The total amount of flow diverted was about 2,100,000 gallons.

Introduction

The City of Los Angeles build the Marquez Low Flow Diversion Project located at 17015 Pacific Coast Highway (Figure 1), to divert dry weather urban runoff from Marquez Avenue Storm Drain into an existing sanitary sewer on Pacific Coast Highway for eventual treatment at the City's Hyperion Treatment Plant.

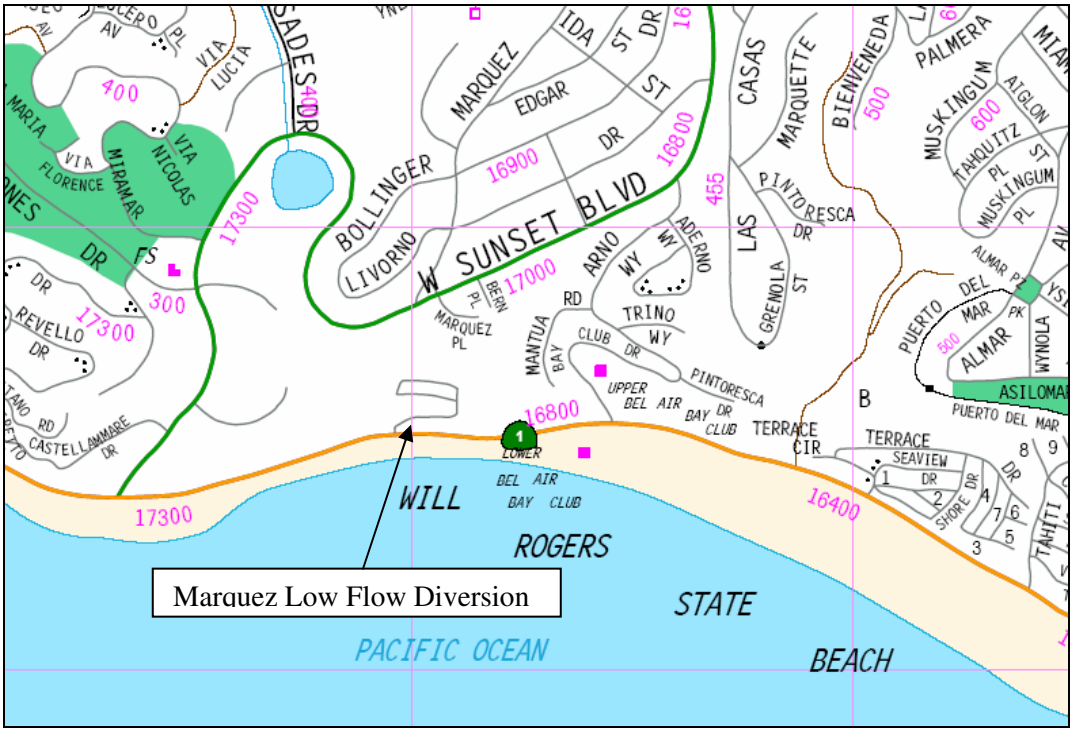


Figure 1. Project Location

The aim is to improve the bacterial water quality at the nearby beach, reduce the number of dry weather beach warnings and closures, protect public health, and comply with the dry-weather bacteria TMDL for Santa Monica Bay and the stormwater NPDES permit requirements.

The design and construction of the project lasted a period of about three years. Subsequently the project started and operation. The water quality near the storm drain outlet was monitored to determine the project effectiveness.

The project was in part funded by the State of California under the Clean Beaches Initiative program. The grant agreement between the City of Los Angeles and the State of California was executed on February 22, 2005. The contract was modified on January 2, 2007 to allow the City additional time to complete the monitoring of the project. By the submittal of this report to the State the City is meeting its final contractual requirements as part of this agreement. Table 1 shown in the next page indicates the due dates and the actual deliverable dates.

The grant agreement also required the City of Los Angeles to monitor the performance of the project subsequent to its implementation. The goals, objective, project information, its implementation approach, schedule, costs and performance evaluation are described in this report.

Table 1. List of Deliverables

Task	Deliverable by Subtask #	Due Date	% of Work Complete	Date Submitted
Exhibit A –Scope of Work			Completed	
Task A1. Quality Assurance Project Plan and Monitoring Plan			Completed	
Subtask A1.1	Quality Assurance Project Plan	January 31, 2005	Completed	01/31/07
Subtask A1.2	Monitoring Plan	May 31, 2006	100%	01/31/07
Task A2. Work to be Performed by Grantee			Completed	
Subtask A2.1.1	Final Plans and Specifications	January 31, 2005	Completed	05/17/05
Subtask A2.1.3	Photo documentation of project construction	April 30, 2006	Completed	04/28/06
Subtask A2.2	City of Los Angeles Board of Public Works Project Acceptance	September 30, 2006	Completed	10/17/07
Subtask A2.4 Reporting			Completed	
Subtask A2.4.1	Annual Progress Report Summary	September 30, 2005 September 30, 2006	Completed Completed	10/31/05 10/31/06
Subtask A2.4.2	Draft Project Report	November 30, 2007	Completed	12/07/07
Subtask A2.4.3	Final Project Report	December 31, 2007	Completed	12/07/07
Exhibit B – Invoicing, Budget Detail and Reporting Provisions			Completed	
Subtask B5.0	Standard Requirements Certifications Form	(As needed)	N/A	-
Subtask B6.1	Quarterly Progress Reports and Invoices	October 20, 2005 and qrtrly thereafter	Completed	4/30/07
Subtask B6.2	Expenditure/Invoice Projections	October 20, 2005 and quarterly	Completed	4/30/07
Subtask B6.3	Grant Summary Form	March 31, 2005	Completed	5/17/05
Subtask B6.4	Natural Resource Projects Inventory Project Survey Form	Before Final Invoice	Completed	12/07/07
Exhibit C – SWRCB General Conditions			Completed	
Subtask C6	Copy of final CEQA/NEPA Documentation	January 31, 2005	Completed	5/17/05
Subtask C22	Signed Cover Sheets for all Permits	January 31, 2005	Completed	5/17/05
Exhibit D - Grant Program Terms and Conditions			Completed	
Subtask D5	Monitoring and Reporting Plan	May 31, 2006	Completed	6/30/06

Problem Statement

Routine shoreline monitoring conducted by the City of Los Angeles in Santa Monica Bay (SMB) indicates exceedance of bacteriological standards in accordance with Assembly Bill (AB) 411, which was enacted in 1998. Coliform bacteria are a public health concern, especially when contaminated runoff mixes with recreational water. As a result, local beaches throughout the Bay are closed or posted with signs warning beachgoers of the presence of bacterial pollution. In 2001, 3 beach mile-days (BMD) of beach closure and 15.57 BMD of beach warning postings were reported for the Will Rogers State Beach. To date this year, 17.54[1] BMD beach warning postings were reported. A major cause of beach closure and posting is urban runoff polluted with

[1] California Beach Closure Report 2000. Division of Water Quality, State Water resources Control Board, California Environmental Protection Agency. July 2001

pathogens from storm drains. SMB is a major receiving water for an extremely urbanized area. Consequently, a substantial amount of bacteria is contributed by these urbanized watershed areas through the storm drain system into the Bay.

Specifically for the Will Rogers Beach, in 2002 alone bacterial contamination notices were posted for 81 days, and in 2003 bacterial contamination notices were posted for 84 days. Urban runoff from the Marquez Avenue drain has been determined to be a significant contributor of bacteria at the beach.

The Will Rogers State Beach is a one and three-quarter-mile stretch along the shore of SMB. The 82-acre beach features swimming, surfing and skin diving. Facilities include volleyball courts, playground and gymnastic equipment, as well as a bike path and walkway that attract a portion of the 55 million[2] SMB beachgoers each year. However, the health of the beach goers, particularly the swimmers within 400 yards of the storm drains are at risk due to polluted storm water and urban runoff discharged from major storm drains into the Will Rogers State Beach.

Urban and storm water runoff contain pollutants such as trash, debris, and pathogens and was viewed as a hazard to beachgoers. In 2002 the Los Angeles Regional Water Quality Control Board developed the Santa Monica Bay Beaches Dry Weather Bacteria TMDL (SMBBB TMDL) that called for the elimination of these discharges into the Santa Monica Bay and encouraged the implementation of low flow diversion facilities including one for the Marquez storm drain.

Project Goals and Objectives

The purpose of the Marquez Low Flow Diversion Project was to eliminate the dry-weather runoff from the Marquez storm drain. This project was expected to bring compliance for the Will Rogers Beach with the Santa Monica Bay Beaches Dry Weather Bacteria TMDL. The TMDL standards for compliance were based on AB411 standards that the State required Los Angeles County Health Department to develop. These limits were established as the recreational limits (Rec-1) for water contact found in the Water Quality Control Plan (Basin Plan) for the Los Angeles Region; and they are the basis for determining compliance in the SMBBB TMDL.

Based on a single sample, the density of bacteria in water from each sampling station at a public beach or public water contact sports area shall not exceed:

- 10,000 total coliform bacteria per 100 ml, or
- 400 fecal coliform bacteria per 100 ml, or
- 104 enterococcus bacteria per 100 ml, or
- 1,000 total coliform bacterial per 100 milliliters, if the ratio of fecal/total coliform bacteria exceeds 0.1.

[2] Santa Monica Bay Beaches Dry Weather Bacteria TMDL. Los Angeles Regional Water Quality Control Board. January 14, 2002

The other objective of this project was to ensure a well functioning diversion facility without allowing runoff to bypass the facility and that would divert runoff between the established dry-weather periods of April 1 to October 31.

Project Description and implementation

Description

In response to these goals and objectives, the low flow diversion facility for urban runoff was constructed to intercept and divert dry weather runoff from the 4-foot diameter Marquez storm drain to the sanitary sewer system. The configuration used for the facility followed the typical low flow diversion systems that previously were used by the city and a schematic is shown in Figure 2. The constructed diversion structure includes a trash well to collect trash and debris, a wet well for pumping out diverted flow, a concrete valve box for controlling flow directions and a metal instrument panel for control switches. The berm was placed in the storm drain to divert dry weather flow and two pumps were installed in the wet well. A sluice gate in the trash well controls the flow from the storm drain during maintenance. The facility allows control from a remote location. This is accomplished by incorporating Supervisory Control and Data Acquisition (SCADA) technology. Work included excavation, shoring, forming of sump well structure, placement of concrete, installation op pumping and piping systems, valves, backfill, resurfacing and other related work.

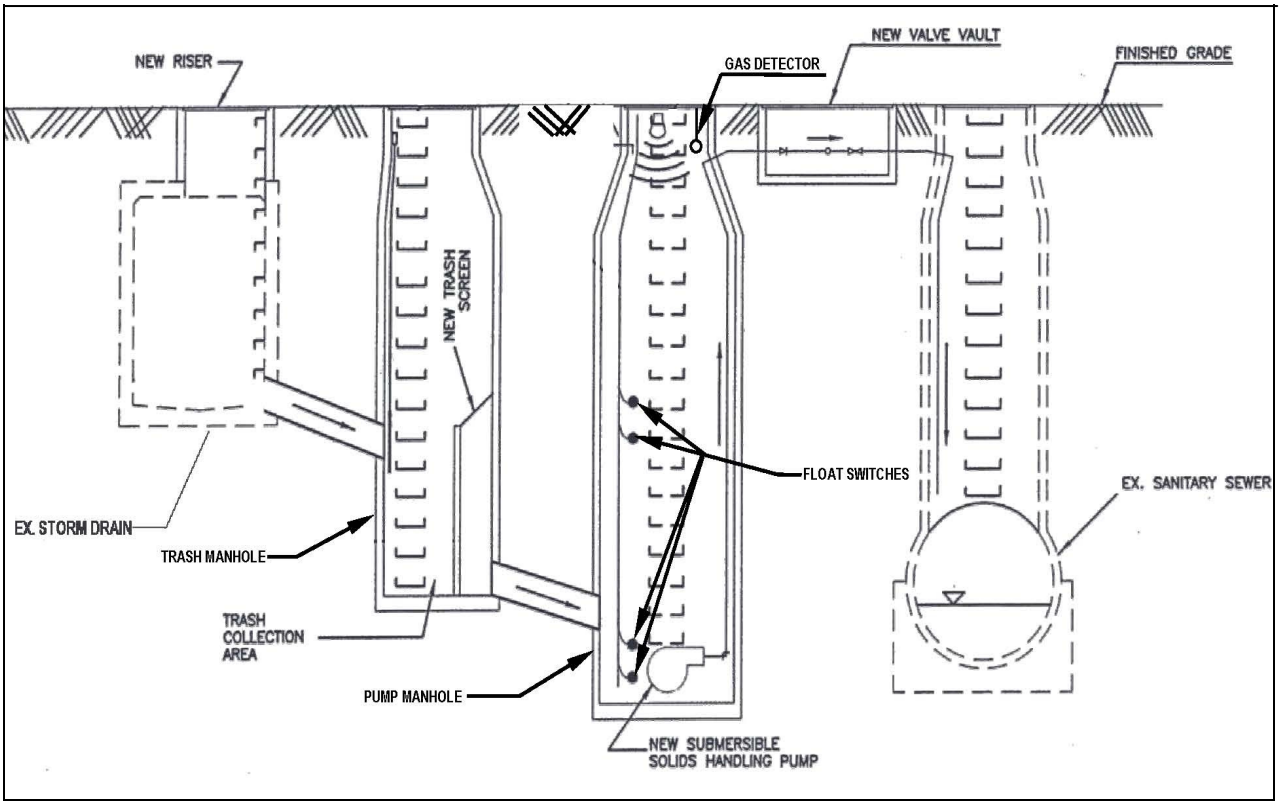


Figure 2. Schematic of a Typical Low flow Diversion Cross Section

Cost

Initial estimates of the project were made in 2002 to be approximately $650,000; of which the City of Los Angeles would apply for CBI Proposition 40 funds totaling $550,000 and the balance would be contributed by the City of Los Angeles. Upon revised estimate in 2004, the construction estimate of the project was revised to $870,000 and that amount was requested from the State Water Resources Control Board (SWRCB) and became the basis of the State's CBI grant and utilizing Proposition 40 funding. The City also committed to provide at least $100,000 in matching funds for the engineering costs of the project. Upon completion the total project cost is about $1.4 million; $870,000 is funded by the State and the remaining $530,000 is funded by the City. The table below show the breakdown of the project costs.

Table 2. Project Cost Breakdown

WO: SZS11233	Program: Stormwater				CIP/Project Number: J230				Project Mgr: Ding Lee 213-485-1541			
BOE Labor	BUDGET								Actual		Remaining	
	Prior Years 6/30/07		This year		Future		Total					
	hours	dollars	hours	dollars	hours	dollars	hours	dollars	hours	dollars	hours	dollars
Predesign												
Environ-56	0	$0	0	$0	0	$0	0	$0	84	$7,381	-84	($7,381)
GED	0	$0	0	$0	0	$0	0	$0	65	$5,611	-65	($5,611)
MEG	0	$0	0	$0	0	$0	0	$0	4	$362	-4	($362)
Survey-63	0	$0	0	$0	0	$0	0	$0	138	$10,917	-138	($10,917)
SW-66	0	$0	0	$0	0	$0	0	$0	27	$1,488	-27	($1,488)
	0	$0	0	$0	0	$0	0	$0	318	$25,760	-318	($25,760)
Design												
Admin. Div-73	0	$0	0	$0	0	$0	0	$0	40	$1,202	-40	($1,202)
ARCH	0	$0	0	$0	0	$0	0	$0	84	$10,678	-84	($10,678)
Environ-56	23	$1,840	0	$0	0	$0	23	$1,840	24	$2,174	-1	($334)
GED	179	$14,320	0	$0	0	$0	179	$14,320	97	$9,189	82	$5,131
Land Dev-87	0	$0	0	$0	0	$0	0	$0	4	$273	-4	($273)
MEG	0	$0	0	$0	0	$0	0	$0	477	$43,328	-477	($43,328)
PACD-41	0	$0	0	$0	0	$0	0	$0	43	$2,371	-43	($2,371)
R E Group-77	119	$9,520	0	$0	0	$0	119	$9,520	0	$0	119	$9,520
Structural-54	155	$12,400	0	$0	0	$0	155	$12,400	500	$39,285	-345	($26,885)
Survey-63	119	$9,520	0	$0	0	$0	119	$9,520	4	$280	115	$9,240
SW-66	1,214	$97,120	0	$0	0	$0	1,214	$97,120	1,206	$108,676	8	($11,556)
WCCD-44	0	$0	0	$0	0	$0	0	$0	3	$222	-3	($222)
	1,809	$144,720	0	$0	0	$0	1,809	$144,720	2,482	$217,678	-673	($72,958)
Bid and Award												
PACD-41	238	$19,040	0	$0	0	$0	238	$19,040	300	$26,654	-62	($7,614)
SW-66	95	$7,600	0	$0	0	$0	95	$7,600	138	$11,138	-43	($3,538)
	333	$26,640	0	$0	0	$0	333	$26,640	438	$37,793	-105	($11,153)
Construction												
ARCH	0	$0	0	$0	0	$0	0	$0	128	$14,906	-128	($14,906)
GED	0	$0	0	$0	0	$0	0	$0	16	$1,451	-16	($1,451)
MEG	0	$0	0	$0	0	$0	0	$0	4	$362	-4	($362)
Structural-54	0	$0	0	$0	0	$0	0	$0	46	$4,963	-46	($4,963)
Survey-63	238	$19,040	0	$0	0	$0	238	$19,040	149	$13,030	89	$6,010
SW-66	619	$49,520	0	$0	0	$0	619	$49,520	1,212	$130,597	-593	($81,077)
WCED-43	0	$0	0	$0	0	$0	0	$0	1	$136	-1	($136)
	857	$68,560	0	$0	0	$0	857	$68,560	1,556	$165,445	-699	($96,885)
Post-Construction												
SW-66	0	$0	30	$2,400	0	$0	30	$2,400	411	$32,583	-381	($30,183)
	0	$0	30	$2,400	0	$0	30	$2,400	411	$32,583	-381	($30,183)
BOE Labor totals:	2,999	$239,920	30	$2,400	0	$0	3,029	$242,320	5,205	$479,259	-2,176	($236,939)

Other Labor			
Department		hours	dollars
Bureau of Con Ad	76	820	$67,889
Bureau of Sanitation	82	7	$481
Department of General Services	40	3	$117
		830	$68,486

Hard Costs		
		dollars
	Total budgeted consultant cost:	

Construction Contract Payments	
Contractor	dollars
CLARKE CONTRACTING CORP	$855,526
Manually entered payments	$0
	$855,526

Project totals:	6,035	$1,403,272

The expenditures reported to the State as part of the quarterly reports are reflected in the reimbursement history by the State are reflected in Table 3.

Table 3. Invoice Tracking Sheet and Summary

Award budget Summary: Awarded Amount $870,000, 10% Withheld $87,000

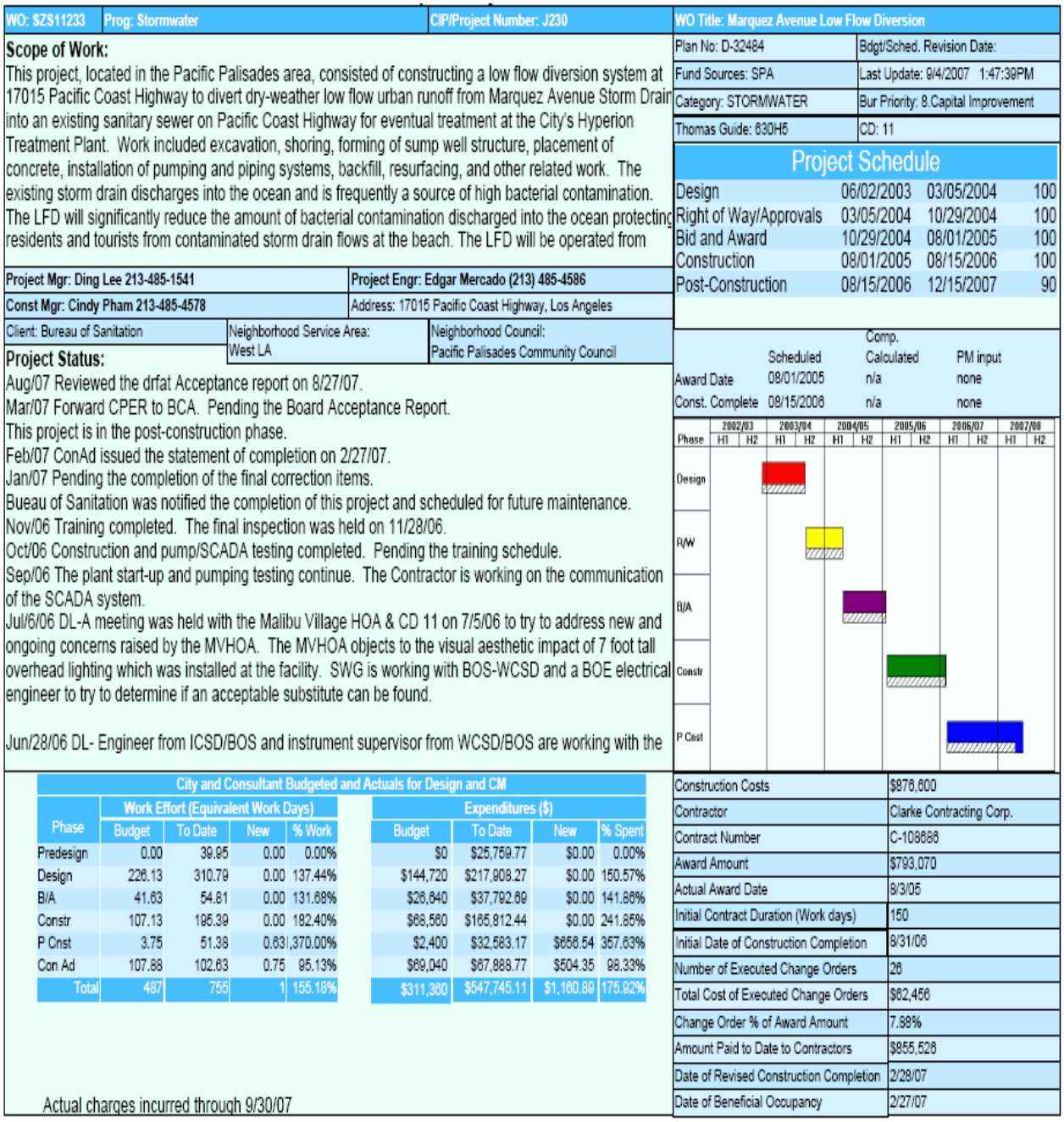
		Personnel Services	Operating Expenses	Equip-ment	Professional Consultant Services	Construction Expenses	Total	Amount Received
Line Item Allotments		**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$870,000.00**	**$870,000.00**	
Inv.	**Billing Period**							
1	1/1/05 - 3/31/05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
2	4/1/05 - 6/30/05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
3	7/1/05 - 9/30/05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
4	10/1/05 -12/31/05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
5	1/1/06 - 3/31/06	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
6	4/1/06 - 6/30/06	$0.00	$0.00	$0.00	$0.00	$470,269.47	$470,269.47	$470,269.47
7	7/1/06 - 9/30/06	$0.00	$0.00	$0.00	$0.00	$206,486.58	$206,486.58	$206,486.58
8	10/1/06-12/30/06	$0.00	$0.00	$0.00	$0.00	$58,459.15	$58,459.15	$58,459.15
9	1/01/07-3/31/07	$0.00	$0.00	$0.00	$0.00	$73,539.66	$73,539.66	$47,784.80
10	4/01/07-6/30/07	$0.00	$0.00	$0.00	$0.00	$57,349.45	$57,349.45	
11	7/01/07-9/30/08	$0.00	$0.00	$0.00	$0.00	$3,895.69	$3,895.69	
Total Amount Spent		**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$870,000.00**	**$870,000.00**	**$ 783,000.00**
Allotment Remaining		**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$87,000.00**

Match budget Summary: Award Budget 970,000, Match Amount $100,000

		Personnel Services	Operating Expenses	Equip-ment	Professional Consultant Services	Construction Expenses	Total
Line Item Allotments		**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$870,000.00**	**$870,000.00**
Inv.	**Billing Period**						
1	1/1/05 - 3/31/05	$21,567.00	$0.00	$0.00	$0.00	$0.00	$21,567.00
2	4/1/05 - 6/30/05	$3,832.92	$0.00	$0.00	$0.00	$0.00	$3,832.92
3	7/1/05 - 9/30/05	$12,662.04	$0.00	$0.00	$0.00	$0.00	$12,662.04
4	10/1/05 -12/31/05	$30,243.58	$0.00	$0.00	$0.00	$0.00	$30,243.58
5	1/1/06 - 3/31/06	$61,917.79	$0.00	$0.00	$0.00	$0.00	$61,917.79
6	4/1/06 - 6/30/06	$57,495.41	$0.00	$0.00	$0.00	$0.00	$57,495.41
7	7/1/06 - 9/30/06	$43,217.64	$0.00	$0.00	$0.00	$0.00	$43,217.64
8	10/1/06-12/30/06	$19,529.13	$0.00	$0.00	$0.00	$0.00	$19,529.13
9	1/01/07-3/31/07	$19,749.04	$0.00	$0.00	$0.00	$0.00	$19,749.04
10	4/01/07-6/30/07	$27,829.48	$0.00	$0.00	$0.00	$0.00	$27,829.48
11	7/01/07-9/30/08	$10,000.00	$0.00	$0.00	$0.00	$0.00	$10,000.00
Total Amount Invoiced		**$308,044.03**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$308,044.03**
Match Remaining		**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**($208,044.03)**

Implementation and Schedule

The schedule of the project is presented in Figure 3 below and was generated by the Bureau of Engineering Uniform Project Reporting System.



WO: SZS11233 | Prog: Stormwater | CIP/Project Number: J230

Scope of Work:
This project, located in the Pacific Palisades area, consisted of constructing a low flow diversion system at 17015 Pacific Coast Highway to divert dry-weather low flow urban runoff from Marquez Avenue Storm Drain into an existing sanitary sewer on Pacific Coast Highway for eventual treatment at the City's Hyperion Treatment Plant. Work included excavation, shoring, forming of sump well structure, placement of concrete, installation of pumping and piping systems, backfill, resurfacing, and other related work. The existing storm drain discharges into the ocean and is frequently a source of high bacterial contamination. The LFD will significantly reduce the amount of bacterial contamination discharged into the ocean protecting residents and tourists from contaminated storm drain flows at the beach. The LFD will be operated from

Project Mgr: Ding Lee 213-485-1541 | Project Engr: Edgar Mercado (213) 485-4586
Const Mgr: Cindy Pham 213-485-4578 | Address: 17015 Pacific Coast Highway, Los Angeles
Client: Bureau of Sanitation | Neighborhood Service Area: West LA | Neighborhood Council: Pacific Palisades Community Council

Project Status:
Aug/07 Reviewed the drfat Acceptance report on 8/27/07.
Mar/07 Forward CPER to BCA. Pending the Board Acceptance Report.
This project is in the post-construction phase.
Feb/07 ConAd issued the statement of completion on 2/27/07.
Jan/07 Pending the completion of the final correction items.
Bueau of Sanitation was notified the completion of this project and scheduled for future maintenance.
Nov/06 Training completed. The final inspection was held on 11/28/06.
Oct/06 Construction and pump/SCADA testing completed. Pending the training schedule.
Sep/06 The plant start-up and pumping testing continue. The Contractor is working on the communication of the SCADA system.
Jul/6/06 DL-A meeting was held with the Malibu Village HOA & CD 11 on 7/5/06 to try to address new and ongoing concerns raised by the MVHOA. The MVHOA objects to the visual aesthetic impact of 7 foot tall overhead lighting which was installed at the facility. SWG is working with BOS-WCSD and a BOE electrical engineer to try to determine if an acceptable substitute can be found.

Jun/28/06 DL- Engineer from ICSD/BOS and instrument supervisor from WCSD/BOS are working with the

WO Title: Marquez Avenue Low Flow Diversion

Plan No: D-32484	Bdgt/Sched. Revision Date:
Fund Sources: SPA	Last Update: 9/4/2007 1:47:39PM
Category: STORMWATER	Bur Priority: 8.Capital Improvement
Thomas Guide: 630H5	CD: 11

Project Schedule

Design	06/02/2003	03/05/2004	100
Right of Way/Approvals	03/05/2004	10/29/2004	100
Bid and Award	10/29/2004	08/01/2005	100
Construction	08/01/2005	08/15/2006	100
Post-Construction	08/15/2006	12/15/2007	90

	Scheduled	Comp. Calculated	PM input
Award Date	08/01/2005	n/a	none
Const. Complete	08/15/2006	n/a	none

City and Consultant Budgeted and Actuals for Design and CM

Phase	Work Effort (Equivalent Work Days) Budget	To Date	New	% Work	Expenditures ($) Budget	To Date	New	% Spent
Predesign	0.00	39.95	0.00	0.00%	$0	$25,759.77	$0.00	0.00%
Design	226.13	310.79	0.00	137.44%	$144,720	$217,908.27	$0.00	150.57%
B/A	41.63	54.81	0.00	131.68%	$26,640	$37,792.69	$0.00	141.86%
Constr	107.13	195.39	0.00	182.40%	$68,560	$165,812.44	$0.00	241.85%
P Cnst	3.75	51.38	0.63	1,370.00%	$2,400	$32,583.17	$656.54	357.63%
Con Ad	107.88	102.63	0.75	95.13%	$69,040	$67,888.77	$504.35	98.33%
Total	487	755	1	155.18%	$311,360	$547,745.11	$1,160.89	175.92%

Actual charges incurred through 9/30/07

Construction Costs	$878,600
Contractor	Clarke Contracting Corp.
Contract Number	C-108888
Award Amount	$793,070
Actual Award Date	8/3/05
Initial Contract Duration (Work days)	150
Initial Date of Construction Completion	8/31/06
Number of Executed Change Orders	26
Total Cost of Executed Change Orders	$82,456
Change Order % of Award Amount	7.88%
Amount Paid to Date to Contractors	$855,526
Date of Revised Construction Completion	2/28/07
Date of Beneficial Occupancy	2/27/07

Figure 3. Project Schedule

The City of Los Angeles Bureau of Engineering began the design of the project in June 2003 and completed the design in March 2004 which cost approximately $217,000 as reflected in Table 2. The Right of Way phase was completed at the end of October 2004, leading to the Bid and Award phase.

On August 3, 2005 the contract was awarded to Clarke Contracting Corp of Manhattan Beach, CA. which came in with a bid of $793,070, the lowest bid. Due to various delays and variations in construction and material cost escalation, the final cost of construction was $876,600. Construction began on August 1, 2005 and was completed on July 5, 2006. Attachment 1 at the end of this report shows pre-construction, during construction, and post-construction pictures.

Plant start-up and 30 day pump testing commenced on July 12, 2006. Construction and testing of the vaults, pumps, instrumentation and monitoring equipment was completed September 30, 2006. The final testing and optimization of the construction was completed by Clarke Contracting Corp. on December 6, 2006. Statement of completion was received on December 9, 2006.

Due to delays in construction the City of Los Angeles requested the SWQCB to extend the time frame for the completion, monitoring and evaluation of the Marquez Low Flow Diversion Project. This request for extending the time frame for the project and project reporting was granted by the SWQCB and extended to the end of 2007.

The construction contractor trained city staff in the operations and maintenance of the pumps, valves, gas detection units, controls, controllers, and software and hardware of the SCADA. The constructor also ran loop checks on the instrumentation and controls for remote monitoring of all equipment.

On February 27, 2007, the City of Los Angeles, Bureau of Contract Administration released the services of the construction contractor by completing the final project inspection and issuing a notice of completion for the project. Finally on October 17, 2007 the Board of Public Works officially closed the contraction contract by accepting the project.

Construction Challenges

Selected Contractor

Clark Construction was selected as the contractor for constructing the Marquez Low Flow Diversion Project after the City of Los Angeles advertised the project upon completion of the design phase.

Clark Construction was one of three bidders whose bids were unsealed at public Board of Public Works meeting. The bids were reviewed for their compliance with the City of Los Angeles ordinances such as Minority Business Enterprise (MBE), Women Business Enterprises (WBE), living wage ordinance, certificate of compliance as to not conduct business with slave trader nations, and scores based on previous performance and cost of construction.

Outreach

Before commencement of construction, stakeholders and neighbors were informed of the plans to construct the low flow diversion facility on the shoulder of Pacific Coast Highway and at the foot of a hilly area with expensive homes on top of it.

To increase neighborhood awareness about the project, the City held neighborhood meetings, appraised stakeholders as to the hours and duration of the construction, adverse factors that may

arise due to construction (such as traffic control, noise, dust) and measures that had been developed to mitigate these adverse effects. The City also provided stakeholders with contact numbers in order to discuss inconveniences and ways and means to mitigate these inconveniences.

Construction Location

Construction of the Marquez Low Flow Diversion is on the shoulder of Pacific Coast Highway as indicated in Figure 1. This highway is a major coastal transportation link between the western businesses and bedroom communities that travel to and fro in the North-South direction. The flow of automobiles consisting of cars and heavy duty trucks is dense especially during the hours of daylight construction.

Safety Issues

Safety of the construction crew and that of the automobiles is of the utmost importance, and to mitigate any potential accident hazards, the construction crews were made aware of traffic control and construction methods by holding training courses targeting traffic control and traffic management. Proper signage and barriers were utilized in off setting any hazards that arose from heavy traffic during construction hours.

Testing of Equipment & Procurement of Electrical Power

Upon completing construction of the low flow diversion trash vault, pump vault, valve vault, installing the relevant piping, pumps, valves, instrumentation and controls, the problem arose at the time of testing the instrumentation and controls. Electrical power was required for the pump and instrumentation panels. The power source was not originally available on site since the project location was at a remote location. Department of Water and PowerDWP was requested to relocate the power source closer to the connection points of the pump and control panels. However this work was not scheduled to be completed in time for the planned testing and start-up.

Waiting would delay the project and the completion date would have to be moved beyond the window of opportunity that was open to conduct the required monitoring and verify the effectiveness of the facility. To mitigate the absence of power supply, the contractor was requested to supply the site with a portable diesel generator to provide power to the various electrical panels at the facility. The portable generator was able to supply sufficient electrical power and for the duration of testing that allowed the contractors to completing testing of electrical and electronic systems and successfully complete loop testing of the SCADA systems.Operation and Monitoring

The facility started to operate on April 1, 2007 and continued to operate until October 31, 2007. During this period the facility was periodically inspected by qualified personnel from the Bureau of Sanitation, Wastewater Collection Systems Division to ensure proper operation. The flow diverted by the facility was gauged and monthly readings are available for the entire operating period. For the months of August, September and October daily readings are also available. Table 4 summarizes the flow data collected during the first operating period of the facility.

Table 4. Diverted Flows (gallons)

Date	April	May	June	July	August	September	October
1					5700	11400	600
2					15900	4500	7800
3					9300	8100	5700
4					9000	6000	6900
5					8700	10200	8400
6					10500	4800	8400
7					6600	11700	5100
8	Monthly total 87,600 gallons No daily totals are available for the month of April 2007	Monthly total 240,600 gallons No daily totals are available for the month of May 2007	Monthly total 412,200 gallons No daily totals are available for the month of June 2007	Monthly total 169,4600 gallons No daily totals are available for the month of June 2007	9000	9300	9300
9					8400	9000	9600
10					8400	7800	7500
11					6600	9300	12300
12					9000	9900	44100
13					6900	9000	163200
14					6600	11100	9900
15					11400	9600	12300
16					6900	4500	12000
17					4500	20400	9600
18					11700	10800	7800
19					4500	8400	12300
20					8700	6000	9600
21					8400	147600	15300
22					9600	52800	12600
23					13800	6900	6900
24					7500	3600	4800
25					9600	7500	6900
26					7200	8400	15000
27					12300	8400	9900
28					8400	7800	7800
29					6000	9900	9600
30					10500	6000	12300
31					11700		5100
Total	87,600	240,600	412,200	169,460	273,300	440,700	474,000

The water quality of the diverted flow and at the beach was monitored by the Bureau of Sanitation, Environmental Monitoring Division. Weekly samples were taken of the diverted runoff from the sampling port of the low flow diversion facility. In addition the shoreline was monitored directly at the mixing zone and at both sides of the mixing location at a distance of 50 feet in each direction. The water quality sampling and analysis was conducted in accordance with the approved Monitoring Plan and Quality assurance and Assessment Plan (QAPP).

Bacteria densities for the four sampling stations are listed in Table 5. A couple of problems were encountered in terms of data quality. On May 30, 2007, the laboratories reported that the lower detection limit was above the level specified in the Monitoring Plan and QAPP for this project.

The results are still deemed "usable" because the detection limits are low enough to compare the samples to AB411 standards. Inclusion of these data can affect calculation of summary statistics (e.g. Geometric mean), but this issue did not affect the storm drain sample, since the reported values were above the detection limits. Another error with detection limits was encountered on June 6, in which the field blank sample was only reported to a detection limit of 10 MPN/100 mL, instead of 1 MPN/100 mL. However, it was decided to include these data for reporting purposes, since there is no evidence to suggest that the integrity of the samples was compromised.

Evaluation and Performance

Table 5 summarizes the water quality data with respect to bacteria indicators. The top of the table summarizes the data from the summer of 2001 which is prior to the implementation of the project. This data from the 2001 dry season show that the mixing zone samples exceeded the AB411 standards 25% of the time; and the 50 yards North/South stations exceeded 19% and 22% of the time, respectively.

The data from the tested samples at the site show a marked improvement in the water quality, due to the fact that there has been only one exceedence during the 2007 testing period. The monitoring data and discussions/comparisons for the dry period are provided later in this document. Also the geometric means for the three indicators are at, or near, the lower detection limits for these samples (10 MPN/100 mL).

The data for the tests conducted during the dry weather period from April 1 to October 31, 2007 indicates that the construction/installation of the Marquez Low Flow Diversion has reduced the exceedence days in Santa Monica Bay, thus proving to be beneficial to the receiving waters, public recreation reduction in dry weather beach warnings, beach closures, and improvement to marine life habitat.

The project also significantly reduced the amount of bacterial contamination discharged into the ocean protecting residents and tourists from contaminated storm drain flows at the beach. The total amount of flow diverted was about 2,100,000 gallons.

Table 5. Water Quality Monitoring Data Summary
Pre-construction Data (2001)

Pre-Construction monitoring

Location ->	Drain			Mix			50 N			50 S		
Date	Tot Coli	E. Coli	Ent.	Tot Coli	E. Coli	Ent.	Tot Coli	E. Coli	Ent.	Tot Coli	E. Coli	Ent.
MAY WK-2	260,000	2,000	8,400	<100	<100	<100	41	<10	<10	20	<10	10
MAY WK-4	>200,000	3,100	5,300	200	<100	<100	75	<10	<10	190	20	10
JUN WK-1	630,000	4,100	2,500	100	<100	100	130	<10	10	380	<10	110
JUN WK-2	230,000	22,000	20,000	<100	<100	<100	340	31	10	200	20	10
JUN WK-3	270,000	8,600	2,000	1,100	310	630	310	110	41	130	10	10
JUN WK-4	280,000	1,000	3,100	12,000	<100	100	1,800	10	120	1,400	41	210
JUL WK-1	2,400,000	1,000	6,400	630	<100	<100	260	10	<10	240	97	10
JUL WK-2	580,000	17,000	3,500	3,600	100	100	37	41	10	110	52	<10
JUL WK-3	1,400,000	2,000	8,900	1,900	<100	100	240	20	<10	370	31	10
JUL WK-4	980,000	6,300	3,300	520	<100	<100	210	10	10	190	20	10
AUG WK-1	650,000	19,000	4,500	750	<100	100	580	10	270	260	10	97
AUG WK-2	>2400000	37,000	>240000	1,100	<100	410	420	<10	<10	510	<10	10
AUG WK-3	2,400,000	39,000	15,000	630	<100	<100	310	<10	30	160	63	10
AUG WK-4	490,000	1,000	3,400	860	200	<100	-	-	-	180	20	10
AUG WK-5	610,000	15,000	7,500	410	<100	<100	300	<10	<10	360	20	10
SEP WK-1	340,000	3,100	1,300	2,600	100	100	97	10	31	1,000	73	170

Post-construction Data (2007)

Location ->	Drain			Mix			50 N			50 S		
Date	Tot Coli	E. Coli	Ent.	Tot Coli	E. Coli	Ent.	Tot Coli	E. Coli	Ent.	Tot Coli	E. Coli	Ent.
04/04/07	9,700	160	31	20	<10	<10	20	<10	<10	20	<10	<10
04/13/07	140,000	520	1,500	20	10	<10	42	10	<10	31	10	<10
04/18/07	43,000	350	960	70	<10	<10	<10	<10	<10	52	20	<10
04/25/07	6,100	280	10	<10	<10	<10	10	10	<10	<10	<10	<10
05/02/07	13,000	130	53	10	<10	<10	10	10	<10	31	10	<10
05/11/07	>200000	880	8,800	<10	<10	10	<10	<10	<10	31	10	<10
05/18/07	120,000	690	850	10	<10	<10	10	<10	<10	10	<10	<10
05/23/07	34,000	540	2,200	<10	<10	<10	<10	<10	<10	<10	<10	<10
05/30/07	49,000	100	210	100	100	<10	<100	<100	<10	<100	<100	<10
06/06/07	34,000	66	540	20	10	<10	71	55	<10	<100	99	71
06/15/07	120,000	240	2,500	88	10	<10	<10	<10	<10	87	<10	<10
06/20/07	>200000	6,800	5,600	20	<10	<10	<10	<10	<10	20	<10	<10
06/27/07	54,000	940	1,300	31	20	<10	10	10	10	31	<10	20
07/06/07	>20000	1,200	910	42	<10	<10	82	<10	10	42	<10	<10
07/13/07	>200000	810	7,800	450	20	10	380	20	<10	430	10	<10
07/18/07	>200000	2,000	7,000	10	<10	<10	10	<10	<10	20	10	<10
07/25/07	70,000	53	750	31	10	<10	20	10	<10	42	10	<10
08/08/07	>200000	530	1,800	20	20	<10	<10	<10	<10	20	<10	<10
08/17/07	>200000	3,200	2,200	10	10	<10	55	<10	<10	42	20	<10
08/24/07	94,000	27,000	1,500	42	31	<10	<10	<10	<10	31	<10	<10
08/29/07	48,000	31	290	88	76	<10	10	<10	<10	<100	75	<10
09/05/07	35,000	31	1,300	53	10	<10	20	<10	<10	120	64	10
09/13/07	11,000	1,200	200	10	<10	<10	<10	<10	<10	<10	<10	<10
09/19/07	31,000	600	470	10	<10	<10	10	<10	<10	<10	<10	<10
09/28/07	88,000	820	2,700	220	20	10	160	10	<10	240	55	<10
10/03/07	48,000	140	180	64	<10	<10	87	<10	<10	<10	<10	INVALID
10/11/07	17,000	42	64	190	20	10	150	140	10	82	<10	10
10/18/07	36,000	240	94	64	<10	10	82	<10	10	88	<10	<10
10/24/07	59,000	320	120	130	20	10	120	<10	10	82	<10	200
10/31/07	43,000	890	710	<10	<10	<10	<10	<10	<10	<10	<10	<10

Conclusions

This project was implemented using standard design and construction practices that have been established by the City of Los Angeles. The project was implemented successfully however at a larger cost than originally estimated. Furthermore the project construction lasted longer than originally planned. This resulted that the City requests an extension to its meeting its deliverables to the State under the grant requirements. With the completion of this report, the City is meeting its final grant requirements with respect to this project.

This project demonstrates through its implementation that a Best Management Practice to improve quality of the beaches, water quality of Oceans, Rivers and Lakes, by diverting dry weather urban runoff, to be treated by waste water treatment plants before discharging to the receiving waters is a feasible and viable project. The alternative is to use other treatment methods, such as disinfection, chlorination, UV exposure or other chemical treatment of the urban dry weather runoff, which could be less cost effective and harmful to the environment.

Monitoring data for the previous dry weather monitoring period has proved, that diverting the discharge from the Ocean has greatly improved the quality of Santa Monica Beaches and Bay. Further testing and validation of results will prove conclusively that the device is effective in combating beach pollution and improving the health of the beach goers and local marine life.